

**REMARKS**

The Office Action mailed August 13, 2007 has been carefully reviewed and the foregoing amendment has been made in consequence thereof.

Claims 1-19 are now pending in this application. Claims 1-7 stand rejected. Claims 8-19 have been withdrawn.

The rejection of Claims 1-7 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicants regard as the invention is respectfully traversed. Under Section 112, second paragraph, claims are to be construed by those of ordinary skill in the art. Schenck v. Norton Corp., 218 USPQ 698, 701-02 (Fed. Cir. 1983). Thus, a claim is only indefinite where those skilled in the art would not understand what is claimed when reading the claim language in light of the specification and prosecution history. Ex parte Sareman, 27 USPQ2d 1472, 1473-74 (B.P.A.I. 1993). In the present instance, Applicants respectfully submitted that one of ordinary skill in the art would have no difficulty in understanding the scope and meaning of "maximum chord reduction" in the context of the present invention as described in the specification. Specifically, as recited in paragraph [0017], "if a rotor blade 10 appears to include damaged and/or deteriorated portions 48, measurements are taken to determine if pre-established reparability conditions have been satisfied. In one embodiment, reparability limits are based on a minimum blade thickness T and a maximum chord reduction which, in the exemplary embodiment, is approximately five percent of the chord." Furthermore, as is known in the art, the "maximum chord reduction" defines a maximum chordwise limit as to an amount of leading edge and trailing edge cutbacks that can be made using the recited repair method for the airfoil to remain functional, not a value "measured in order to determine the damaged portion of titanium alloy material *needed* to be removed," as is suggested on page 3 of the Office Action.

Applicants respectfully submit that Claim 1, as amended, satisfies the requirements of 35 U.S.C. § 112, second paragraph. Claims 2-7 depend from independent Claim 1, which is submitted to satisfy the requirements of Section 112. Accordingly, Applicants respectfully request that the Section 112 rejections of Claims 1-7 be withdrawn.

The rejection of Claims 1-7 under 35 U.S.C. § 103(a) as being unpatentable over Randolph, Jr. et al. (U.S. Pat. No. 6,453,211) (“Randolph”) in view of Applicants’ Admitted Prior Art (“AAPA”) and further in view of Burke et al. (U.S. Pat. No. 6,508,000) (“Burke”) is respectfully traversed.

Randolph describes a method of repairing blades (12b) of a blisk (12). The method includes cutting away bend damage (32) of the blade (12b) to form a cutout (46) at a leading edge (42) of the blade (12b). The cutout (46) is then filled with weld material or an insert welded metallic spade to form a weld repair (48) that is larger than a nominal configuration of the blade (12b). Randolph also describes that “[i]n a recent development program, the weld repair of titanium blisk for a gas turbine compressor application is being explored. Damage to the relatively thin leading or trailing edges of an individual blade may be repaired by removing the damaged portion and weld repairing the remaining cutout.” (col. 2, lines 14-19). Notably, Randolph does not describe nor suggest a method that includes determining a portion of titanium alloy material to be removed based on a determined airfoil reparability limit such that a leading edge, trailing edge and tip cutbacks are defined in the airfoil. Further, Randolph does not describe nor suggest a method that includes depositing titanium weld material onto a cutback.

AAPA describes a method of repairing a turbine compressor blade by mechanically removing a worn and/or damaged tip area and adding a material deposit to the tip area to reform the area to the desired dimension. Notably, AAPA does not describe nor suggest a method that includes determining a portion of titanium alloy material to be removed based on an airfoil reparability limit such that a leading edge, trailing edge and tip cutbacks are defined in the airfoil. Further, AAPA does not describe nor suggest a method that includes depositing titanium weld material onto a cutback.

Burke describes a method for repairing airfoil blades (3, 18, and/or 42) along a leading, a trailing edge, or a tip. The method includes removing a portion of the airfoil (3, 18, and/or 42) and replacing the portion with an insert (1). More specifically, the insert (1) is shaped as an arc segment and transient liquid phase bonded to the original airfoil (3, 18, and/or 42). To use transient liquid phase bonding, the insert (1) must be crystallographically and structurally aligned with the original airfoil (3, 18, and/or 42) to avoid forming discontinuities across a bond line. More specifically, the insert (1) has the same grain/crystal size, alignment, and/or orientation as the original airfoil (3, 18, and/or 42). Mismatches in

grain/crystal size, alignment, and/or orientation produce deleterious grain boundaries within the bond. When repairing an airfoil tip, the insert (1) is one to three inches in radial length. A bond medium or bond foil, for the transient liquid phase bonding must match the chemistry of the insert (1) and airfoil (3, 18, and/or 42) material to form a uniform microstructure and chemical composition along the bond line. Titanium is then removed from the bond foil to avoid deleterious gamma prime eutectics at a bond center line. Notably, Burke does not describe nor suggest a method that includes depositing titanium weld material onto a cutback. Further, Burke does not describe nor suggest a method that includes determining a portion of titanium alloy material to be removed based on an airfoil reparability limit such that a leading edge, trailing edge and tip cutbacks are defined in the airfoil.

Claim 1 recites a method of repairing a gas turbine engine compressor blade airfoil that includes “determining an airfoil reparability limit, the limit defining a maximum chord reduction . . . determining a portion of titanium alloy material to be removed based on the determined airfoil reparability limit . . . removing the determined portion of titanium alloy material from along leading and trailing edges of the airfoil, and along an entire edge area of a radially outer tip of the airfoil to form respective leading edge, trailing edge, and tip cutbacks which each define cut-back depths, wherein the edge area extends from the leading edge to the trailing edge . . . depositing titanium weld material onto the leading edge, trailing edge, and tip cut-backs . . . and removing at least some of the titanium weld material to obtain pre-desired finished dimensions for the leading and trailing edges, and radially outer tip.”

No combination of Randolph, AAPA, and Burke describes nor suggests a method of repairing a gas turbine engine compressor blade airfoil as is recited in Claim 1. More specifically, no combination of Randolph, AAPA, and Burke describes nor suggests a method that includes determining a chord reduction depth. Furthermore, no combination of Randolph, AAPA, and Burke describes nor suggests a method that includes determining a portion of titanium alloy material to be removed based on an airfoil reparability limit such that a leading edge, trailing edge and tip cutbacks are defined in the airfoil. Moreover, no combination of Randolph, AAPA, and Burke describes nor suggests a method that includes depositing titanium weld material onto the leading edge, trailing edge, and tip cut-backs. Rather, in contrast to the present invention, Randolph describes removing damaged leading and trailing edge portions of a titanium blisk and weld repairing the blisk, AAPA only describes removing a damaged tip area and adding a material deposit to only that portion of

the tip area, and Burke describes an insert transient liquid phase bonded to an airfoil to create a bond with a uniform microstructure and chemical composition.

Accordingly, for at least the reasons set forth above, Claim 1 is submitted to be patentable over Randolph in view of AAPA, and further in view of Burke.

Claims 2-7 depend, directly or indirectly, from independent Claim 1. When the recitations of Claims 2-7 are considered in combination with the recitations of Claim 1, Applicants submit that dependent Claims 2-7 likewise are patentable over Randolph in view of AAPA, and further in view of Burke.

Furthermore, it is impermissible to use the claimed invention as an instruction manual or “template” to piece together the teachings of the cited art so that the claimed invention is rendered obvious. Specifically, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the art to deprecate the claimed invention. It appears that the present rejection reflects an impermissible attempt to use the instant claims as a guide or roadmap in formulating the rejection using impermissible hindsight reconstruction of the invention. The United States Supreme Court has recently expressed concern regarding distortion caused by hindsight bias in an obviousness analysis, and notes that factfinders should be cautious of arguments reliant upon ex post reasoning. See KSR International Co. v. Teleflex, Inc., slip Opinion at page 17. The Supreme Court also explained that, following “common sense,” “familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle.” Id. at page 16. Applicants respectfully submit that the teachings of Randolph, AAPA, and Burke do not fit together like pieces of a puzzle, but rather are isolated disclosures, which have been chosen in an attempt to deprecate the present invention. Of course, such a combination is impermissible, and for this reason alone, Applicants request that the Section 103 rejection be withdrawn.

Additionally, if the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. In re Gordon, 733 F.2d 900, 221 U.S.P.Q. 1125 (Fed. Cir. 1984). MPEP § 2143. In the Office Action, the Examiner alleges that it would be obvious to “have provided Randolph Jr. et al. with the repair of the outer tip as taught by AAPA including the necessary length and size of the repair as taught by Burke et al. ...” However,

Burke requires an insert that is crystallographically and structurally aligned with the airfoil and that has the same grain/crystal size, alignment, and/or orientation as the airfoil such that transient liquid phasing bonding may be used. Burke further requires that the blade tip inset be one to three inches in length. As such, it would not have been obvious to one skilled in the art to combine the welding of Randolph and AAPA with the transient liquid phasing bonded insert of Burke. As such, the combination of Randolph and AAPA with Burke would not result in a method that includes depositing titanium weld material onto the leading edge, trailing edge, and tip cut-backs, as is required by Applicants' claimed invention.

Moreover, Burke requires the removal of titanium from a bonding foil to avoid formation of deleterious gamma prime eutectics at a bond line. As such, it would not have been obvious to one skilled in the art to combine the titanium blisks of Randolph with non-titanium bonding foil of Burke. As such, the combination of Randolph and AAPA with Burke would not result in a method that includes depositing titanium weld material onto the leading edge, trailing edge, and tip cut-backs, as is required by Applicants' claimed invention. Accordingly, for this reason alone, Applicants respectfully request that the Section 103 rejection of Claims 1-7 be withdrawn.

For at least the reasons set forth above, Applicants respectfully request that the Section 103 rejection of Claims 1-7 be withdrawn.

In view of the foregoing amendment and remarks, all the claims now active in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited.

Respectfully Submitted,



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